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Vascular Morphology and Respiratory Physiology of the Segmented Marine Worm *Glycera Dibranchiata*

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Poster Presentation 25

**VASCULAR MORPHOLOGY AND RESPIRATORY PHYSIOLOGY OF THE
SEGMENTED MARINE WORM GLYCERA DIBRANCHIATA**

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Glycera dibranchiata is a common polychaete worm that, like other segmented worms, has a large fluid-filled body cavity, a coelom, which it uses as a hydrostatic skeleton and as a means of circulating hemoglobin-containing cells (hemocytes) for respiration. We have observed that, in addition to the hemocyte-filled coelomic system, *G. dibranchiata* also possesses a previously undescribed pumping vascular system. This vascular system lies on the dorsal and ventral surfaces of the gut, and communicates, in the vicinity of the worm's brain, with a space overlying the ventral nerve cord. This system of blood vessels also contains red pigment, which is suggestive of the presence of hemoglobin. The hemoglobin in the coelomic cells has been well characterized by other authors, but the presence or characteristics of hemoglobin in the vascular system has not previously been reported. Although, the coelomic hemoglobin of *G. dibranchiata* has been closely scrutinized by biochemists because of its unique properties, this information has not been integrated into an understanding of the organism's physiology. Mangum (1974) and Colacino (pers. com.) have proposed alternate hypotheses explaining the need for several hemoglobins of varying oxygen affinities, spatially arranged in an individual, as observed in *G. dibranchiata*. Mangum's hypothesis suggests that the spatial arrangement of different types of hemoglobin with increasing oxygen affinities towards the center of the organism provide a slow leak of oxygen to tissues during times of oxygen stress. Colacino (pers. com.) proposes that the proximity of a higher-affinity hemoglobin to the organism's nerve cord provides oxygen for quick bursts of nerve firing, regardless of oxygenation of the environment. Our work provides a morphological description of the vascular system of *G. dibranchiata*, preliminary characterization of the respiratory pigment in the vascular system, and tests hypotheses describing the role of various respiratory pigments in the overall ecology of *G. dibranchiata*.